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               POLARIZATION DIVERSITY IN MEDIUM-RANGE EXTENDED TARGET MODEL RE--ETC(U)
               JAN 78   R L MITCHELL   DAAK40-78-C-0031
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RFSS

POLARIZATION DIVERSITY IN MEDIUM-RANGE EXTENDED
TARGET MODEL REQUIRES SIX RFSS CHANNELS

TECH NOTE 105-035

6 JAN 78

Technical note,

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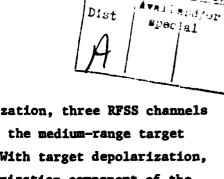DTIC
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POLARIZATION DIVERSITY IN MEDIUM-RANGE EXTENDED
TARGET MODEL REQUIRES SIX RFSS CHANNELS

R. L. Mitchell

MRI Report 149-8

6 January 1978

Without any consideration of target depolarization, three RFSS channels
are required to simulate an extended target with the medium-range target
model derived by Mott (see MRI Report 132-44). With target depolarization,
six RFSS channels are required, two on each polarization component of the
three horns making up the triad.

This requirement is easy to demonstrate. Without depolarization, in
general, we are first computing sums of the form

$$\sum_i V_i \quad \text{and} \quad \sum_i x_i V_i$$

to simulate the glint and Doppler modulation signals where V_i and x_i are
the complex reflection coefficient and angle associated with the ith
scatterer (see MRI Report 149-5). With target depolarization, the sums
are now of the form

$$\sum_i P_{i1} V_i \,, \quad \sum_i P_{i2} V_i \,, \quad \sum_i x_i P_{i1} V_i \,, \quad \sum_i x_i P_{i2} V_i$$

where P_{i1} and P_{i2} are the two polarization components associated with the
ith scatterer. Since P_{i1} and P_{i2} are not necessarily proportional,
i.e.,

$$P_{i2} \neq k\, P_{i1}$$

where k is independent of i, we require a doubling of the number of such
sums when target deplarization is included in the models.

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For the short-range target model (the one based on the "injection" concept), this doubling of the RFSS channels is not necessary since the signals that would be received by the individual monopulse channels are being simulated directly. The depolarization is automatically accounted for in the simulation process, provided the polarization geometry (missile roll, etc.) is given.